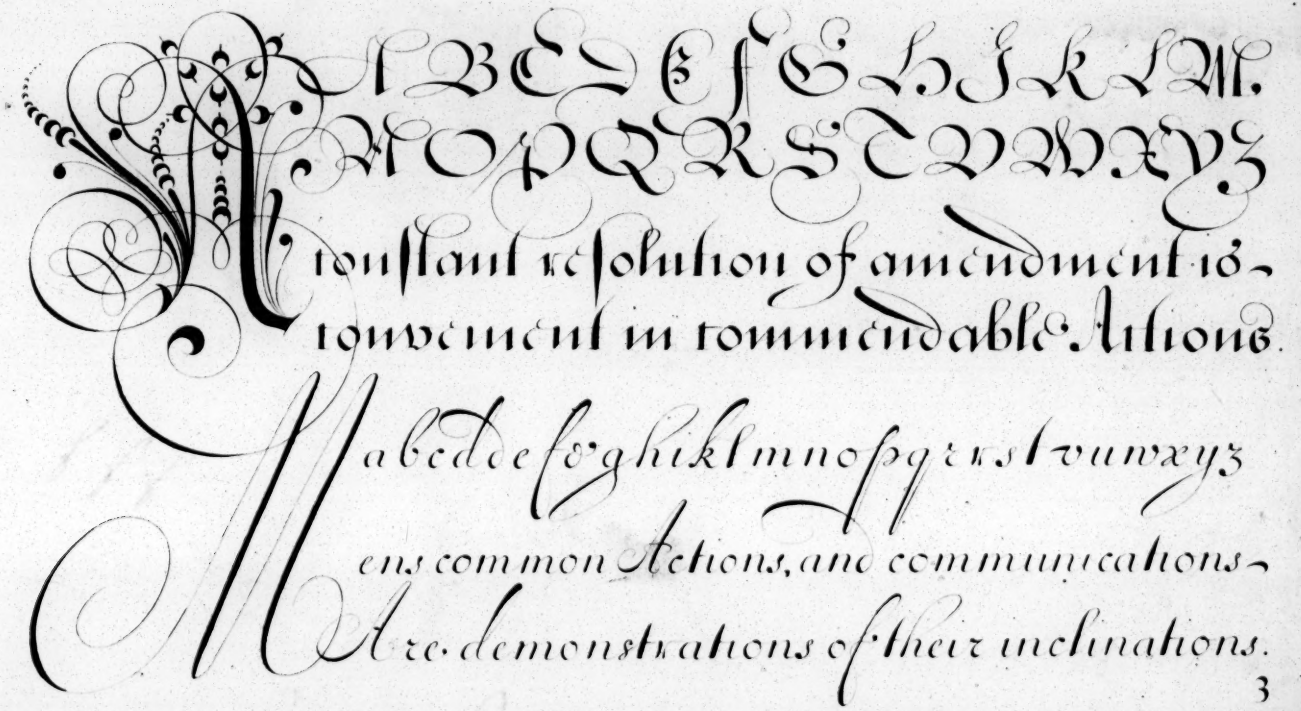
Sold by [illegible] Rooks at ye Lamb, at the East end of St Pauls Church LONDON 1664

the the the



A B C D E F G H I K L M.
N O P Q R S T V W X Y Z

A constant resolution of amendment is
convenient in commendable Actions.

M a b c d d e f g h i k l m n o p q r r s t v u w x y z

ens common Actions, and communications
Are demonstrations of their inclinations.

3

Mens common Actions and communi

Cocker

A Blessed Conversation Directs to Eternall
ffelicity; Great Heavenly & Immortall King
Lead vs in Mercy; Now O Preserver Quitt
Repentant Sinners, and let Thy Verity &
Wisdome make vs X times Yet more Zealous

A a b c d e f g g h i k l m n o p q r r s s t v u w x y z ç

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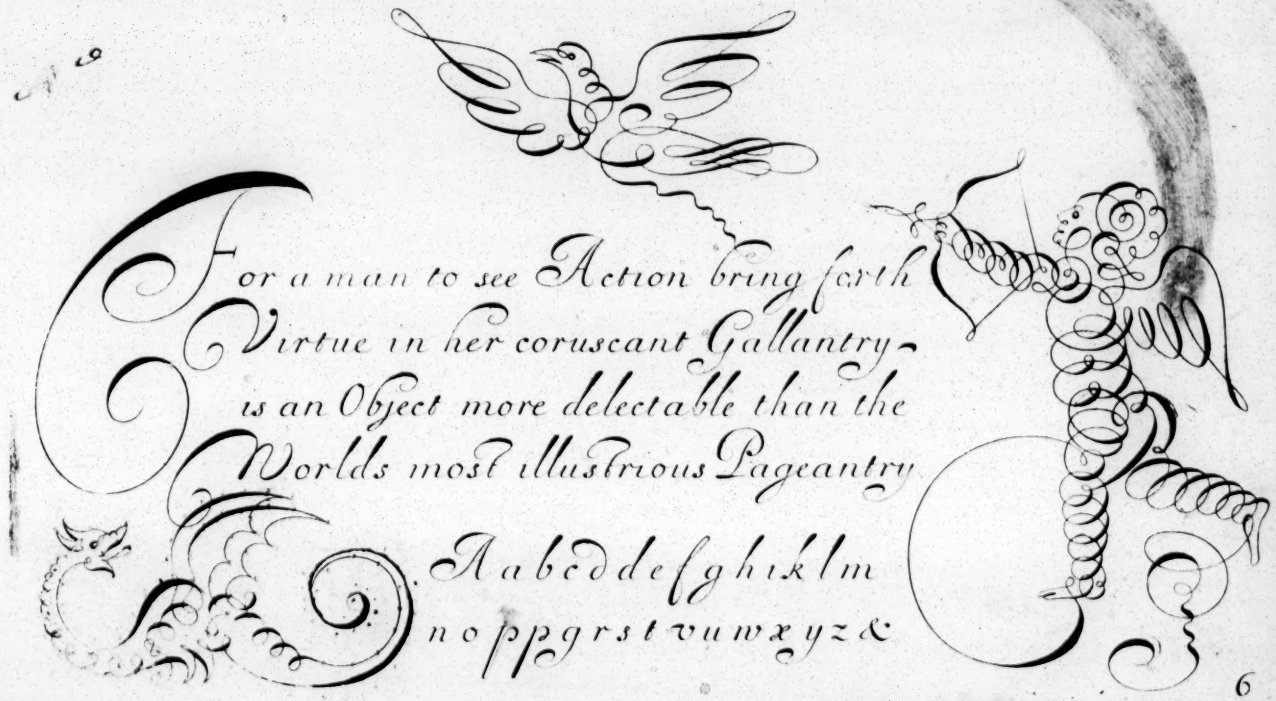
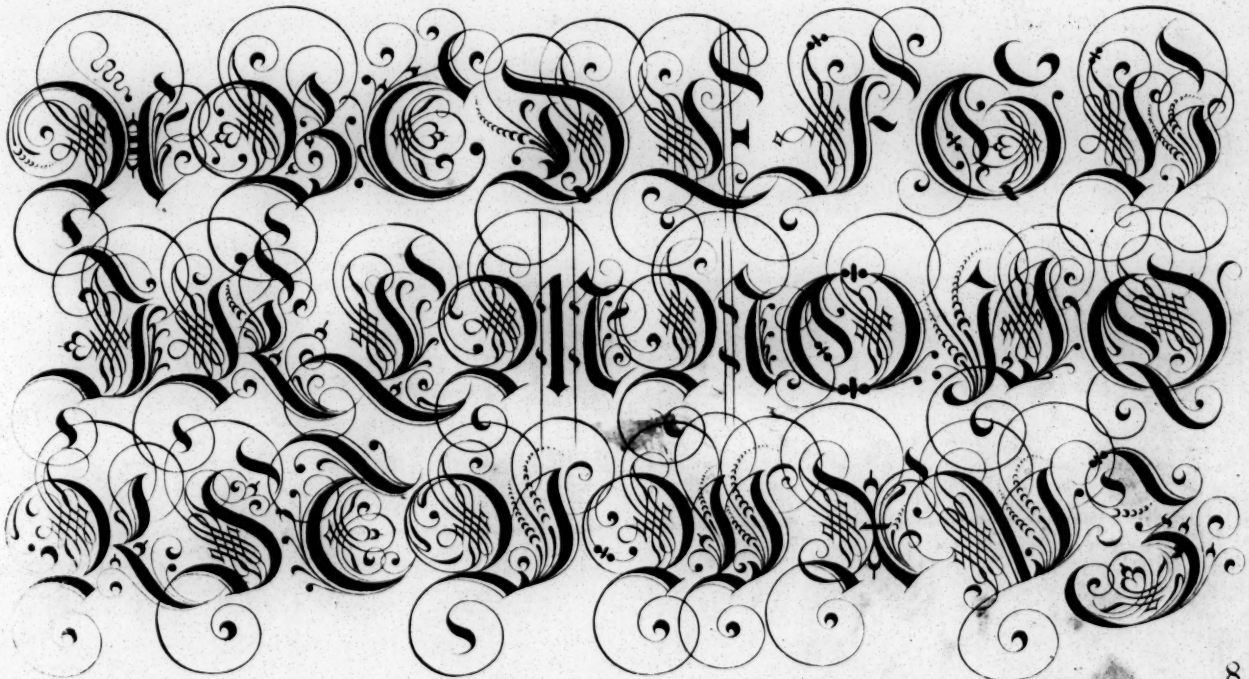
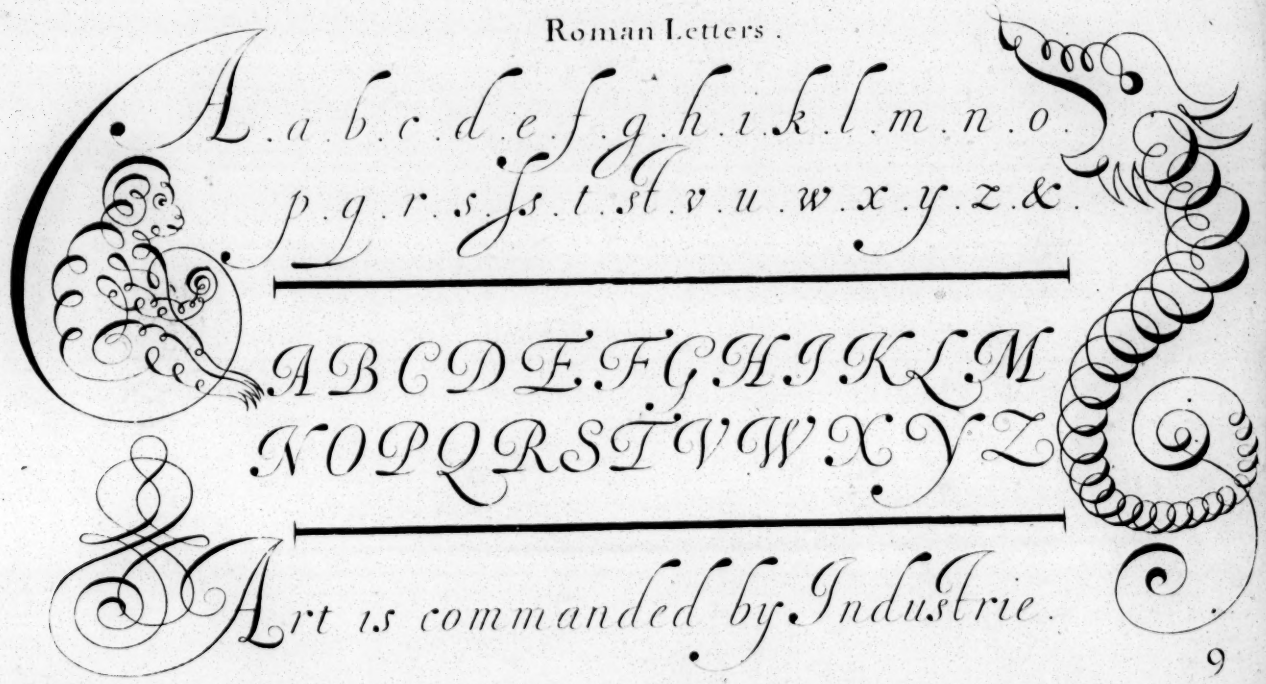

For a man to see Action bring forth
Virtue in her coruscant Gallantry
is an Object more delectable than the
Worlds most illustrious Pageantry
A a b c d d e f g h i k l m
n o p p g r s t v u w x y z &
6

BRITISH
MUSEUM
29 JUN 1901

The divine Commandments are of admirable concernment for the information of our minds, and reformation of our manners.

A a b c d e f g h i k l m n o p q r s ſ t v u w x y z z c




A.a.b.c.d.e.f.g.h.i.k.l.m.n.o.
p.q.r.s.ſs.t.st.v.u.w.x.y.z.&.
ABCDE.FG.H.I.K.L.M
NOPQRSTVW.X.Y.Z
Art is commanded by Industrie.

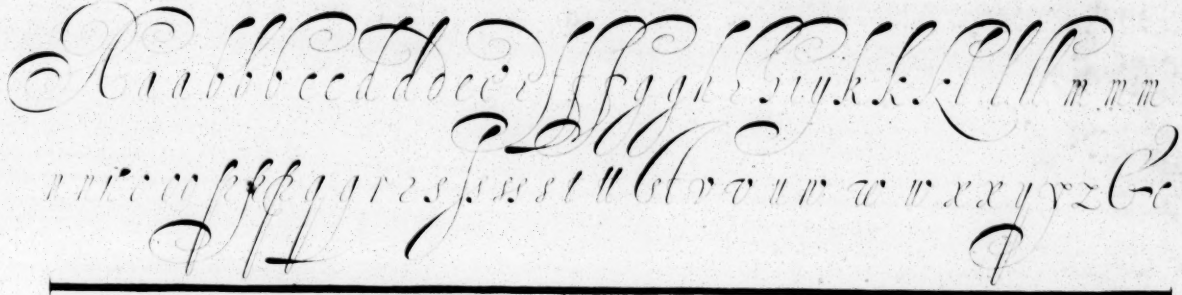
BRITISH
LIBRARY
BOOKS

Since mens Imaginations are commonly various as their faces, no wonder; if some, through ignorance or envy, discommend those performances w.ch others commend

A a b c d e f g h i k l m n o p q r ſ s t v u w x y z &

a f

10 10



Prize exquisite workmanship, & be carefully diligent.

Notwithstanding our innumerable
Remembrancers of Mortality, wee
consume our precious time in vanity
and remaine vnmindfull of Eternity.

SMITHSONIAN
LIBRARY
MUSEUM

Court

Chancery

Char

Carolus ordinis dei gratia Angl Scot ffrancie et
hibnie Rex fidei defensor et Omnibus ad quos

BRITISH
100083
MUSEUM

TO THE READER

r Advancement of the publick Good, I am contented to deſcend and condeſcend to the accommodation of thoſe who have ſmall time, and it may be, leſs Coin, yet great deſires to learn the commendable and moſt neceſſary of Fair-Writing: *being deſirous that all the ſonnes of Ingenuity may be the better for the good wiſhes and ſtance of*

EDWARD COCKER.

To make a PEN.

HAving a Pen-knife with a ſmooth, thin, ſharp Edge; take the firſt, ſecond, or third quill of a Gooſe wing and ſcrape it, then hold it in your left hand, with the feather-end from you, and beginning even in the Back, cut a ſmall peece off ſloping: then, to make a ſlit, enter the knife he middle of the firſt cut, put in a quill and force it up ſo far as you deſire the ſlit ſhould be in length; ch done, cut a piece ſloping away from the other ſide above the ſlit, and faſhion the Nib by cutting h the ſides equally down; then place the nib on the nail of your left hand thumb, and to end it, draw edge into it ſlanting, and being half through, turn the edge almoſt down-right, and cut it off.

For large Hands let the Nib be broad; for ſmall
Cut it more narrow; take this Rule for All.

To hold the Pen.

Hold the Pen in the right hand, with the hollow ſide downward; on the left ſide place your thumb, ng in the joynt; on the right ſide your middle finger, near half an inch from the end of the nib, and r fore-finger on the top, a ſmall diſtance from your thumb.

To ſit to write.

Sit upright, with your body from the board or desk whereon you write : bear your head at leaſt th
ſtance of a ſpan from the paper : let the Paper lie even before you : draw in your right Elbow : turn
hand outward , and bear it lightly : gripe not the Pen too hard : with your left hand ſtay the paper.

Sit not ſo high, as quite to over-look
The well-intended Copies in this Book.
Mark and remark all things that may concern,
For he that learns to Write *muſt write to learn;*

Neceſſaries for writing.

Procure a Book in *quarto* of *Dutch* paper, white, ſmooth, and well gumm'd ; wherein rule double l
at a convenient diſtance, with a Ruler and a pair of map-Compaſſes, or a black-lead pen; which lines
come out being rubbed with bread: or rule with a piece of ordinary lead drawn to a point: or you ma
a quill forked, and therewith rule your lines double at what diſtance you pleaſe.

Rub your paper lightly with *Gum Sandrick*, beaten fine and tyed in a linnen cloth; which makes th
per bear ink, and the pen run ſmooth.

Let the Thing which you write on ſtand ſloping, and chooſe a fore-right light or one on the left ſi

Keep a waſte paper under your hand , whereon to try your pen ; and let your Ink run freely from
Pen. The common fault of Ink is thickneſs, which to cure , ſteep ſome broken Galls in Water a da
two, then ſtrain them, and with that water bring your Ink to a right body : if Ink ſinks too much, p
a ſmall quantity of *Gum Arabick*, if it ſinks not enough, put Vinegar therein.

Directions for the ſecond leaf, which is marked with a figure of 2.

This leaf contains the Breaks of all the ſmall ſet Secretary Letters, ſtanding in ſev
ſqua

res ; ſhewing from one part to another how to proceed by degrees to the making of every Letter.
his Set-hand, though it be not much uſed , except for Indentures, Records, Deeds, Conveyances, &c.
ecauſe it is a good Ground and Foundation for other Hands, we preſent you with it firſt.
the imitation of this Copie you need not rule ſuch lines as make the ſquares, but with a quill cut
ed , or a ſmall pair of Compaſſes rule double lines , to keep the letters even at head and foot. Then
ce your paper as is directed, if you think fit ; and having a well-cut-pen , whoſe nib may agree with
readth of the down-right ſtrokes. Begin, and imitate the (*a*) and diligently obſerve, as in this, ſo in
etters what parts require a ſmall hair-ſtroke , and thoſe make lightly with the edge of the pen , and
e full ſtroaks are required, apply the flat nib of the Pen.
hen you can make each Letter well by their parts or breaks, rule twenty four lines on a ſheet of pa-
and fill the firſt line with (*a*) , the ſecond with (*b*) , the third with (*c*) , &c. and be ſure to make one
r perfectly, before you proceed to another ; thus if you make but four letters well in a day, you will
the whole Alphabet or all the four and twenty letters compleat in a Week.

Directions for the third Leaf.

erein is firſt an Alphabet of Capital Letters, proper to the ſmall Letters on the ſecond leaf : theſe Let-
would not wiſh you to imitate all one after another , as they ſtand ; but make the eaſieſt firſt , and
whoſe likeneſs may render them helpfull to the making one of another in this Order, *C. E. T. O. Q. G.*
B. R. N. M. V. W. P. X. ſo *L. H. K. I. F. D. S. A. Y. Z.* forget not to apply the Edge of the pen
e they are ſmall, and the flat nib where they are full ; giving them a true round compaſs where they

 require

require it, with a ſwift, bold motion of your hand ; and I muſt re-mind you to make one letter ſo of till the well making thereof may encourage your proceeding to the next. So in all.

The two lines of Joyning under the Capitals are of the ſame Hand with the former letters, only a fering (*d*) and (*f*), are inſerted for more expedition.

The chief Rules for Joyning

Both for this and other Hands are, That the diſtance from one Letter to another in words, be ſo much as one ſtroak ſtands from another in the ſmall (*m*), and the diſtance from word to word be ſo much as the breadth of the ſmall (*o*) : the minums, as namely the ſtroaks of the (*m*), (*n*) and the bodie-ſtroaks of the long letters muſt ſtand, or lie all one way in the ſame Piece of Writing.

The line of ſmall Letters, and the other two lines of Joyning are compounded of *Secretary*, *Roman Italian*, depending upon the form of a Circle, for which a pen with a ſmooth cut Nib, and a long Slit be beſt. I would wiſh ſuch as fancie this Hand (having the accommodations and preparation aforeſaid write ſo many lines after every Letter in the Alphabet, till they can make them truly well ; obſer to turn your right hand outward, or from you as you write, and hold the nib of the pen the ſame wa the letters ſtand, inclining toward the right hand ; carefully obſerving the *Compaſſings*, *dephths*, *diſtan full* and *ſmall* of every Letter.

Directions for the fourth Leaf.

The Directions for the latter part of the third leaf being well obſerved, may ſerve for this ; for it not be ſo much for the encouragement and profit of Learners to practiſe theſe Letters all at once as ſtand, as to make them one after another ; nor will it be fit for Practitioners to write after one Copie

y, and another the next. But it will be beſt for a beginner to fix upon ſome ſuch one *Hand* as may be moſt oper to the buſineſs which he would fit himſelf for, and never leave practiſing till he hath gained the ſtery thereof; diligently obſerving the particular and general Rules before and after delivered. You ſt fit the Pen to the nature of every Hand you write, and try it ſo often on a waſte paper till it anſwer ur deſires.

You will find no difficulty in thoſe hands on the fifth and ſixth Leaves, obſerving the Rules. And as for Text-hand on the ſeventh, the breaks of the Set-hand letters on the ſecond leaf will inform you how h Letter in the making is begun, continued and finiſhed. Obſerve to bring the minnums and the ſtroaks the (*b*) (*h*) (*k*) (*l*) *&c.* almoſt down to the line you write on, and taking up the Pen, turn the nib reof toward your left hand, and laying it flat, make the ſquare ground-ſtrokes of the Letters, and draw ir bodies even down, not permitting them to incline to the right hand or to the left.

For the Text-Capitalls on the eighth leaf.

Fit the nib of your Pen to the breadth of their ſtrokes, and draw their body-ſtrokes firſt. Then for knots, firſt make the circumvolving ſtrokes on which the reſt depend, then draw one ſtroke on the left e, and two or three on the right ſide, as the faſhion thereof requires; which done, with a ſmall Pen aw ſo many croſs hair-ſtrokes as are requiſite; and laſtly cloſe them and the body-ſtrokes of each Knot cording to it's form.

For the Roman-Hand on the ninth and tenth leaf.

When double lines are ruled, and every thing ready with a Pen of an indifferent ſize, well cut. Firſt, itate the ſmall (*l*), (*n*) and (*o*) ſo long till you can make them well; then proceed to make the ſmall

Letters

Letters that bear refemblance to one another, as the *c, e, o, a, d, g, q*: then the *b, d, f, h, k, l, &c.* whe ſtemms or body-ſtrokes keep of an equal height.

In making the Great Letters

Obſerve alſo which may be helpfull to the making one of another in this order *C. G. O. Q. &c.* th *I. K. H. A. N. M. T. F. E. P. R. B. D. V. W.* the reſt in what order you pleaſe. For Joyning obſerve well t foregoing and following General Rules.

Rules for Italian Hand, on the eleventh and twelf Leaf.

This Hand depends upon the form of an Oval, and muſt be written with a Pen that hath a clear lo ſlit, and a long ſmall nib, and the hand in Writing hereof muſt be born lightly, and move freely. In yo imitation obſerve the Rule for the likeneſs of Letters delivered for the Roman. In Joyning you mu unite all ſuch Letters as will naturally joyn, by ſmall hair-ſtrokes, drawn with the left corner of the Pe

For the laſt Leaf.

This contains *Court* and *Chancery* Hands, which would require more ample Directions than the Compe diouſneſs of our preſent deſign will admit. It is more tolerable for both theſe Hands to encline towa the left than toward the right hand: and the left ſide of the Pens nib, as you hold it to write, muſt ſhorter then the right for both.

For the ſhapes of the Letters, and Joyning, I commend this Leaf to your diligent obſervation and pr ctice, and wiſh you good ſucceſs..

Gener

COCKER'S

TUTOR to

ARITHMETICK;

eing a New and moſt eaſie Method, ſo eaſie that the meaneſt Capacity may underſtand it at firſt ſight.

Written and invented by EDWARD COCKER *Maſter in* Writing.

There is alſo ſold with this Book that Excellent Copy-Book called *The Tutor to Writing.*

LONDON,

inted by *R D.* and are to be ſold by *Tho. Rooks* Stationer at the *Lamb* and *Ink-bottle* at the Eaſt-end of *S. Paul's* Church, where is alſo ſold all ſorts of Blanck Bonds.

General Rules which are proper to be uſed as Copies for learners to write by in any Hand.

Sit upright from the Board ; your Copie well regard :
Reſt not upon your Arms ; nor gripe your Pen too hard.
Keep from the Book your head the diſtance of a ſpan :
Your hand with gentle poize move ſmoothly as you can.
Your Paper and right Arm muſt both ſtrait forward lye ;
To ſmall ſtrokes the Pens edge, to full the flat apply.
All down-right ſtrokes make full ; and ſuch as do deſcend
From left to right, which are drawn ſtraight, or elſe do bend.
Equality of whites *muſt compaſs Letters grace ;*
For diſtance of your words obſerve a ſmall (o's) *ſpace.*
The diſtance of your Letters minnums ſtrokes diſplay :
All Letters in a Piece muſt tend and bend one way.

FINIS.

To ingenious Practitioners in the ARTS of *Writing* and *Arithmetick*.

BEcauſe Writing *and* Arithmetick *are commonly learn'd together, being of equal concernment in moſt mens affaires, That you might reap a double benefit by this Book, I have here delivered ſo much of* Arithmetick *as neceſſary to be known in order to the management of moſt Trades, which is ſo methodically compoſed, and plainly expreſſed, that I hope thoſe of the meaneſt capacities will underſtand it at the firſt ſight. I would wiſh you to proceed orderly from the beginning, and underſtand one part well before you advance to another, and exerciſe your ſelf in ſetting down, and working the like Examples in every Rule.* EDWARD COCKER.

Arithmetick is the Art of Numbring.

TO Number is to compute, or reckon how many things there are of any kind, when occaſion requires. Thus he numbers, that can tell how many dayes there are in a week, or how many pence there are in a ſhilling, or can count from One to Twenty. This and the like is done naturally and cuſtomarily. But the Art of *Arithmetick* extends farther, and will enable you to write down any uſefull number propounded. To adde two or more Numbers, and to find what they amount to in one Summe. To ſubſtract, or take a leſſer Number from a greater, and to find what remains: andalſo to find unknown proportions in Numbers. This is in effect the Summe and Subſtance of *Arithmetick*; therefore be not diſcouraged, but begin confidently, and proceed induſtriouſly.

NOTATION is the firſt part of *Arithmetick*, and ſo called, becauſe herein are delivered the Notes or Characters or Figures, wherewith Numbers are written or repreſented, of which there are two ſorts.

F

Firſt Literal, which are ſeven letters of the Alphabet written and valued thus:

I, one; V, five; X, ten; L, fiftie; C, a hundred; D, five hundred; M, a thouſand.

Secondly Figural, which are ten, formed and valued thus;

0.	9.	8.	7.	6.	5.	4.	3.	2.	1.
Cypher.	nine.	eight.	ſeven.	ſix.	five.	four.	three.	two.	one.

Thus each Figure is valued when it ſtands alone. But when they ſtand in Numbers they are valued acrding to their places.

The places of Numbers are reckoned from the right hand toward the left: thus in the date of this preſt year 1664. four ſtands in the firſt place, the 6 beyond it ſtands in the ſecond place, the next 6 ſtands the third place, and the 1 ſtands in the fourth place.

Any figure ſtanding in the firſt place of a Number, hath but its ſingle value; any figure in the ſecond ace of a Number hath ten times its ſingle value; any figure in the third place of a Number, hath a hued times its ſingle value; in the fourth place, a thouſand times its ſingle value; in the fifth place, ten ouſand time its ſingle value; in the ſixt place, an hundred thouſand times its ſingle value; in the ſeenth place of a Number any figure ſtands for ſo many thouſand thouſands or Millions, as it hath *units ones* in the firſt place; in the eighth place it ſtands for ten times ſo many Millions; in the ninth place, hundred times ſo many millions; in the tenth place, a thouſand times ſo many millions, *&c.* Every llowing place, reckoning from right to left, being ten times ſo much as the former.

1. To value a Number, we begin at the right hand and proceed toward the left, ſaying, Units, tens, ndreds, thouſands, ten thouſands, *&c.*

To pronounce or read a Number, we begin at the left hand and proceed toward the right.

For Example, I preſent the nine figures as an Entire Number; and the better to explain theſe Rules, have ſet the values of the places above them, and the names of the places underneath.

C Millions.	X Millions.	Millions.	C Thouſands.	X Thouſands.	Thouſands.	Hundreds.	Tens.	Unit.	*The values of the places.*
9	8	7	6	5	4	3	2	1	
ninth place	*eighth place*	*ſeventh place*	*ſixth place*	*fifth place*	*fourth place*	*third place*	*ſecond place*	*firſt place*	The order of the places.

To value this number we begin at the 1, ſaying, Units, tens, hundreds, thouſands, *&c.*

To read we begin at the 9, ſaying, nine hundred eighty ſeven Millions, ſix hundred, fifty four thouſand, three hundred twenty one.

The Cypher, by it ſelf, ſignifies nothing; yet gives the value of any figure by which it is placed toward the right hand a ten-fold Augmentation; thus 10 ten, 20 twenty, 30 thirty, 40 fourty, 50 fifty, 60 ſixty, 70 ſeventy, 80 eighty, 90 ninety, 100 a hundred.

For the Eaſie valuing and reading of Large Numbers, we may begin at the right hand, and put a Comma after every third figure; then the firſt ternary or three figures, reckoning from the right hand, are Units,

Units, tens, hundreds; the ſecond three are Units, tens, hundreds of thouſands; the third three are Units, tens, hundreds of Millions; and the fourth ternary or three, are Units, tens, hundreds of thouſands of Millions. Thus if this Summ be given to be read, 321, 987, 654, 321 we muſt after it is pointed thus pronounce it; Three hundred twenty one thouſands of Millions, nine hundred eighty ſeven Millions, ſix hundred fifty four thouſands, three hundred twenty one. Let this Summ be given to be read in like manner, 1,203,405,607,809 after it is diſtinguiſhed into ternaries we thus read it, One Million of Millions, two hundred and three thouſand, four hundred and five Millions, ſix hundred and ſeven thouſands, eight hundred and nine.

ADDITION.

HE can Add who knows that 1 and 1 makes 2, that 1 and 2 make 3, that 2 and 3 make 5, and that 5 and 4 make 9. This may be done without the pen; but when two or more large Numbers are to be added, they muſt be written down, and like Degrees or Places of Numbers muſt ſtand in even Rows one under another; Units even with units, tens even with tens, hundreds even with hundreds, *&c.* and under all draw a Line.

When the Numbers are ſo placed, you muſt begin your Addition at the Units place of the loweſt Number, and carry ſo many as that firſt figure ſtands for in mind to the figure above it, which ſtands in the units place of the next Number, and then carry ſo many as both thoſe make, to the next figure above, *&c.*

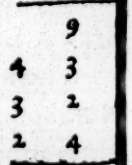
When you know how many all the figures of the firſt Row amount to, if it be leſs than ten, ſet it down under the firſt Row, and proceed to the next, *&c.*

Let 4 3 2 and 3 2 4 and 2 4 3 be three Numbers given to find their Total Summ. Place them as is directed, and draw a line under them thus;

Then add up the first Row toward the right hand, beginning at the units place of the lowest number, saying, 3 and 4 make 7, and 2 make 9, which set under the line in the place of Units thus;

Then add up the next Row, saying, 4 and 2 make 6, and 3 make 9, which set by the other in the place of tens, thus;

Then add up the last Row, saying, 2 and 3 make 5, and 4 make 9, which set under the line in the place of hundreds, thus;



So the Total Summ of the three given Numbers is Nine hundred ninety and nine.

L

Let 983 and 850, and 825 and 783 be given to find the Total. Obſerve the ſame order of placing as in the former, and begin your Addition at the units place, and add up the firſt Row as before, ſaying, 3 and 5 is 8, neglect the Cypher, and 3 is 11, which is two above any ſingle figure, and cannot be ſet under the firſt Row. Here is to be noted, that when any of the Rows amounts to more than a ſingle figure, for ſo many tens as you find in the firſt Row or the place of units, ſo many times one you muſt add to the ſecond Row or place of tens. Obſerving to ſet what is above one, two, or more even tens under the Rows as they ariſe. Then for ſo many tens as you find in the ſecond Row or place of tens, ſo many ones you muſt add to the third Row, *&c.* This order muſt be obſerved if there be more Rows, and at the laſt Row toward the left hand you muſt ſet down all, *&c.*

9	8	3	
8	5	0	
8	2	5	
7	8	3	
			1
9	8	3	
8	5	0	
8	2	5	
7	8	3	
		4	1

Proceed in your Addition, the firſt Row amounts to 11, ſet 1 under the firſt Row, and for the 10 carry 1 in mind to the next Row, ſaying, 1 and 8 is 9, and 2 is 11, and 5 is 16, and 8 is 24; place 4 under the ſecond Row, and carry 2 for the twenty, or two tens, to the third Row, ſaying, 2 and 7 is 9, and 8 is 17, and 8 is 25, and 9 is 34; ſet 4 under the laſt Row, and 3 a place further toward the left hand, thus;

9	8	3	
8	5	0	
8	2	5	
7	8	3	
3	4	4	1

To perform Addition, without troubling the memory with carrying, &c.

For Example take the Numbers last given, which place as before, but draw the line the space of a figure lower from the last number as in the Margent, and begin to add as before, saying, 3 and 5 is 8, and 3 is 11, which set wholly down; place 1 under the line even with the first Row, and 1 above the line under the second Row, thus;

9	8	3
8	5	0
8	2	5
7	8	3
	1	
		1

Then add up the second Row, saying, 1 and 8 is 9, and 2 is 11, and 5 is 16, and 8 is 24; set 4 under the line even with the second Row, and 2 above the line under the third Row, thus;

9	8	3
8	5	0
8	2	5
7	8	3
2	1	
	4	1

Then add up the third Row, saying, 2 and 7 is 9, and 8 is 17, and 8 is 25, and 9 is 34; which set down as before, thus;

9	8	3	
8	5	0	
8	2	5	
7	8	3	
2	1		
3	4	4	1

Another Example.

Here the first Row amounts to 15, which I set wholly down, placing 5 under the line against the first Row, and 1 above the line under the second Row: the second Row amounts to 28, which I also set wholly down, 8 under the line even with the second Row, and 2 above the line under the third Row: the third Row amounts to 35, I set 5 under the line even with the third Row, and 3 above the line under the fourth Row; the fourth Row amounts to 44, which I wholly set under the line;

9	8	6	9	
7	5	1	0	
3	9	4	2	
8	4	0	3	
5	1	8	0	
9	6	8	1	
3	2	1		
4	4	5	8	5

Thus the Total Summ of the Six given Numbers is Fourty and four thousand five hundred eighty and five. Which you may imagine to be so many Men, or Shillings, or Sheep, or what you please that can be numbred.

Addition of Money.

Note that four Farthings make a Penny, 12 pence make a Shilling, and 20 shillings make a Pound sterling. The Character of Pounds is, *l.* of Shillings, *s.* of Pence, *d.* and of Farthings, *q.*

How to place the Numbers.

Place the Numbers in Rows; those of like denominations, names or kinds, one under another; as pounds under pounds, shillings under shillings, and pence under pence, *&c.* and under all draw a Line:

How to add the Numbers.

Begin your Addition with the least kind first, as here Farthings, and for every four in the Row of farthings,

things carry one to be added to the place of pence; for every 12 in the Rowes of pence carry one to the place of ſhillings, and for every 20 in the Rowes of ſhillings carry one to the place of pounds; the odd farthings, pence or ſhillings ſet down under their own Rowes.

For example add theſe ſix ſumms of Money, to find the Total Summ.	*l.*	*ſ.*	*d.*	*q.*
Fourty nine pounds, nineteen ſhilllings, eleven pence and three farthings	49	19	11.	3
Thirty ſix pounds, eighteen ſhillings, ten pence, two farthings	36	18	10.	2
Twenty five pounds, ſeventeen ſhillings, nine pence farthing	25	17	09	1
Thirty pounds, ſixteen ſhillings, eight pence, three farthings	30	16	08.	3
Twenty one pounds, fifteen ſhillings, ſeven pence, two farthings	21	15	07.	2
Twelve pounds, fourteen ſhillings, ſix pence, three farthings	12	14	06	3
	5	4	3	
	178	03	06	2

Begin, add up the Row of Farthings, ſaying, 3 and 2 is 5, and 3 is 8, and 1 is 9, and 2 is 11, and 3 is 14, that is thrice four or three pence to be carryed to the place of pence, and 2 farthings to be ſet under the Row of farthings, which 3 pence you may ſet in a ſmaller figure under the firſt Row of pence, as here; then add up the Rowes of pence with the 3 ſet down, and at every 12 you may make a tittle, ſaying, 3 and 6 is 9, and 7 is 16, there ſet a tittle, and carry the over-plus to the next above, ſaying, 4 and 8 is 12; there ſet a tittle; then 9 and 10 is 19, there ſet a tittle, and add the over-plus to the next above, ſaying, 7 and 11 is 18, ſet a tittle at 11 for the ſhilling, and ſet the 6 pence that is over-plus under the line in its

place;

place: then ſeeing three are four tittles denoting ſo many ſhillings, ſet 4 under the firſt Row of ſhillings, and add them up, yet not both theſe rowes up at once as in the pence, but thus, ſaying, 4 and 4 is 8, and 5 is 13, and 6 is 19, and 7 is 26, and 8 is 34, and 9 is 43, that is two pounds and 3 ſhillings; ſet the 3 under the line even with the firſt Row of ſhillings, and carry the two pounds to the next Row, where every 1 ſtanding in the place of tens is ten ſhillings, and conſequently two of them make a pound, of which there are 6, which is three pounds, and the two you carry is 5 pounds; ſet a cypher under that Row, and carry 5 to the place of pounds, which ſet under the firſt Row; and add up the pounds, ſaying, 5 and 2 is 7, and 1 is 8, and 5 is 13, and 6 is 19, and 9 is 28; ſet 8 under the firſt Row, and carry 2 for the twenty to the next, ſaying, 2 and 1 is 3, and 2 is 5, and 3 is 8, and 2 is 10, and 3 is 13, and 4 is 17; which ſet wholly down, and the Total Summ of the ſix given Numbers is One hundred ſeventy eight pounds, three ſhillings, ſix pence, and two farthings.

Another Example in Addition of Money, wherein a more plain and eaſie way is delivered for adding up the Rowes, &c.

Begin; add up the Row of pence, ſay 6 and 7 is 13, draw a line above the 7, ſet 12 under it and one above it, which add to the next figure, ſaying, 1 and 8 is 9, and 5 is 14, draw a line over 5, ſet 12 under it and 2 above it; then 2 and 4 is 6, and 3 is 9, and 9 is 18, draw a line over 9, ſet 12 under it and 6 above it; then 6 and 2 is 8, and 11 is 19, draw a line above the 11, ſet 12 under it and 7 above it. And becauſe there is nothing to add that 7 to, being ſo much above the twelves, place it under the Row of pence as part of the Total; then for every 12 under the lines, carry one to the place of ſhillings, and add up the firſt Row, ſaying, 4, 13, 21, without naming every

l.	*ſ.*	*d.*	7
31	10	11	12
23	11	02	6
42	12	09	12
30	13	00	
28	14.	03.	
20	15	04	2
16	16	05	12
19	17	08	1
10	18.	07	12
11	19	06	
237	09	07	
205	13	08	
237	09	07	

every figure, then point 8, and add up, saying, 1, 8, 14, 19, 23; point 4, and add up, saying, 3, 6, 8, 9: which place under that Row betwixt the lines; then for the two points carry 2 to the next Row, where every 2 units make a pound, amounting to 7 pounds in all, which carry to the first Row of pounds, and add up, saying, 7, 8, 17, 23, 31, 33, 36, 37; set 7 under the first Row betwixt the lines, and carry 3 to the next, saying, 3, 4, 5, 6, 7, 9, 11, 14, 18, 20, 23, which set wholly down, and the Total Summ is 237 pounds, 9 shillings and 7 pence.

Thus read 1 shilling is 12 pence, 2 shillings are 24 pence, 3 shillings are 36 pence, &c.

£. is	d.
1	12
2	24
3	36
4	48
5	60
6	72
7	84
8	96
9	108
10	120
11	132
12	144
13	156
14	168
15	180
16	192
17	204
18	216
19	228
20	240

This you may do in all Additions, as of Measure, Weight, &c. observing how many of the lesser Denominations make one of the greater. Yet that you may readily know how many shillings there are in any Number of pence, and excuse this labour or the blotting of your Account with points or tittles, take notice that

A Pound sterling contains 20 shillings, or	240
The half whereof is an Angel, 10 shillings, or	120
The half of that is a Crown, 5 shillings, or	60
And half a Crown is 2 shillings and 6 pence, or	30
Then two third parts of a pound are a Mark, 13 shillings and 4 pence or	160
The half whereof is a Noble, 6 shillings and 8 pence, or	80

Pence.

Or you may make use of that Table in the Margent, which shews how many pence there are in any Number of shillings from One to Twenty.

For Proof of all the foregoing and following Additions: Add all the Numbers except the uppermost, and set their Total Summ under the first Total, which last Total add

add to the uppermoſt Number, and if they make the firſt Total the Work is true, elſe not. Obſerve that no Number exceeds 3 in the place of farthings, nor 11 in the place of pence, nor 19 in the place of ſhillings, and you may ſet your ſelf Summs at pleaſure.

Addition of Cloath-Meaſure.

4 Nails make a quarter of a Yard. 4 Quarters make a Yard.

Yard.	*Qr.*	*Na.*
10	3	3
11	2	2
12	1	1
9	3	3
44	3	1

Addition of Troy-weight.

24 Grains make 1 penny-weight. 20 Penny-weights make 1 Ounce, and 12 ounces make 1 pound *Troy.*

Lb.	*Oun.*	*P.w.*	*Gr.*
3	02	11	12
2	10	09	06
1	11	10	10
4	05	06	11
12	05	17	15

Addtion of Liquid Meaſure.

2 Pints make 1 Quart, 2 Pottles make 1 Gallon, 63 Gallons make 1 Hogshead, 4 Hogsheads make 1 Tun.

Tuns.	*H.h.*	*Gal.*	*Pot.*	*Qrts.*	*Pints.*
10	3	10	1	1	1
11	1	14	0	1	0
12	1	18	1	0	1
13	2	11	0	1	0
47	3	55	0	0	0

Addition of Averdupois Little weight.

8 Drams make 1 Ounce, 16 ounces make 1 Pound.

Lb.	*Oun.*	*Dr.*
4	12	13
3	10	07
2	11	10
1	09	09
12	12	07

Addition of Averdupois Great weight.

16 Ounces make 1 pound, 28 pounds make 1 quarter of a hundred, and 4 quarters make 1 hundred.

C.	*Qu.*	*Lb.*	*Oun.*
9	3	12	11.
6	2	11.	10
5	1	09	08.
3	0	13	12
24	3	19	09

Addition of Time.

60 Minutes make 1 hour, 24 hours make 1 day, and 365 dayes make a year.

Years.	*Days.*	*Ho.*	*Min.*
4	101	10	11
5	120	09	19
6	111	12	20
7	030	01	01
22	363	08	51

Addition of Land-Measure.

40 Poles or Perches make 1 Rood, 4 roods make 1 Acre.

Acr.	*R.*	*P.*
10	3	30
11	2	19
16	1	06
20	3	35
59	2	30

Addition of Dry Measure.

2 Pints make 1 Quart, 2 quarts make 1 Pottle, 2 pottles make 1 Gallon, 2 gallons make 1 Peck, 4 pecks make 1 Bushel.

B.	*P.*	*Gal.*	*Pot.*	*Qrts.*	*Pts.*
6	3	1	0	1	1
7	2	0	1	1	1
8	1	1	0	0	1
9	2	0	1	1	0
32	2	0	0	0	1

To work all these Additions, begin at the least Denomination first, and observe how many of the lesser make one of the next greater: so many as you find carry to the next; the odd ones set down under the Rowes as they arise, and prove them all as Addition of Money.

Such as can work Division may divide the Numbers which the Rowes of the lesser Denominations amount to, by so many as make one of the next greater. The quotient will be the Number to be carryed, and if any thing Remains, it is to be set under the Row from which you carry, *&c.* *Sub-*

A B C D E

SUBTRACTION.

Subtraction takes a Leſſer Number from a Greater, and gives the Remainer.

Thus take 1 from 2 and there remains 1, take 3 from 5 and there remains 2, take 4 from 7 and there remains 3, take 5 from 9 and there remains 4, *&c.* This and the like may be done without the Pen, but when larger Numbers are to be taken or ſubtracted one from another, firſt write down the Number from which the Subtraction is to be made, and under that ſet the Number to be taken from it, which is leſſer or equal, *&c.* placing units under units, tens under tens, *&c.* under both draw a Line.

Example: Take 1345 from 2579, and find what remains, place them thus;

2 5 7 9
1 3 4 5

Begin your Subtraction at the right hand, and proceed toward the left; take the firſt figure of the leſſer and lower Number from the firſt figure of the upper Number, and ſet what remains even with them under the Line, ſaying, 5 from 9 there remains 4, thus;

2 5 7 9
1 3 4 5
4

Then take the next figure of the lower Number from that above it, ſaying, 4 from 7 there remains 3, which ſet down thus,

2 5 7 9
1 3 4 5
3 4

Then take the next lower figure from that above it, ſaying, 3 from 5 there remains 2, which ſet down thus,

2 5 7 9
1 3 4 5
2 3 4

Laſtly,

Laſtly, take 1 from 2 there remains 1, which ſet down thus,

	2	5	7	9
	1	3	4	5
The Remainer,	1	2	3	4

Subtraction is proved by Addition. Add the lower Numbers, if their Summ be the ſame with the upper Number the Work is true, elſe not, thus,

	2	5	7	9
	1	3	4	5
	1	2	3	4
The Proof,	2	5	7	9

Another Example. Subtract 56789 from 84321; place the leſſer Number under the greater, draw a line under them as in the margent, and ſubtract, beginning at the units place as before, ſaying, 9 from 1 you cannot; therefore borrow ten from the place of tens, and ſay 9 from 11 there remains 2, which ſet under, *&c.*

8	4	3	2	1
5	6	7	8	9
				2

Obſerve, that as in Addition for every ten you had in the firſt place, you were to add one to the ſecond place; contrarywiſe, in Subtraction for every ten you want in the firſt place you muſt take one from the ſecond; after that, it will be all one whether you eſteem the next figure above to be ſo many leſs as you borrowed, or the next figure underneath to be ſo many more: but I rather reſtore what was borrowed to the next figure undeath, ſaying, one I borrowed, and 8 is 9; then 9 from 2 I cannot, but 9 from 12 there remains 3, thus;

8	4	3	2	1
5	6	7	8	9
			3	2

Then one I borrowed, and 7 is 8, which 8 from 3 I cannot take, but 8 from 13 there remains 5, thus;

8	4	3	2	1
5	6	7	8	9
		5	3	2

Then one I borrowed, and 6 is 7, from 4 I cannot take, but 7 from 14 there remains 7, thus;

```
84321
56789
 7532
```

Laſtly, one I borrowed, and 5 is 6, then 6 from 8 and there remains 2, which I ſet under, and the work is finiſhed; thus,

```
84321
56789
27532
```

Another Example. Begin at the right hand at the units place as before, ſaying, 6 from 2 I cannot, but 6 from 12 and there remains 6, which ſet under; then one I borrowed, and 5 is 6, which from the cypher or nothing I cannot take, but 6 from 10 and there remains 4, which ſet under, then one I borrowed, and 2 is 3 from 8 and there remains 5, which ſet under, then 4 from 3 I cannot take, but 4 from 13 and there remains 9, which ſet under; then one that I borrowed and 3 is 4, from 2 I cannot take, but 4 from 12 and there remains 8; laſtly, one I borrowed and 6 is 7, from 9 there remains 2, which ſet under aud the work is finiſhed.

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923802
634256
289546
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To work Subtraction without troubling the memory with borrowing and carrying, &c.

Take the laſt Example but one; place the Numbers as before, and ſet 9 over every figure, *&c.* then ſubtract the lower Number from the Nines, and to the remains add the figures from which the ſubtraction ſhould be made, and ſet what they make under the line, *&c.* Begin at the right hand at the units place, ſaying 9 from 9 there remains nothing, but 1 underneath and 1, which muſt alwayes be added in the firſt place is 2, which ſet down and proceed, ſaying 8 from 9 there remains 1, and 2 is 3,

```
99999
84321
56789
27532
```

is 3, which ſet down, then 7 from 9 there remains 2, & 3 is 5, which ſet down, then 6 from 9 there remains 3, and 4 is 7, which ſet down; laſtly, 5 from 9 there remains 4, and 8 is 12, neglect the 10, and ſet down only what is above 10, which is 2, and the Remainer is as before.

Take alſo the laſt Example which was wrought the common way. Begin as before, ſay 6 from 9 there remains 3, and 2 under 9 is 5, and 1 which muſt alwayes be added in the firſt place is 6, which ſet down; then 5 from 9 there remains 4, which ſet down, ſince there is nothing but a cypher under 9; then 2 from 9 there remains 7, and 8 is 15, ſet down 5 and take 1 from 4 the next figure, which you muſt alwayes do in this caſe; then 3 from 9 there remains 6, and 3 is 9, which ſet down; then 3 from 9 there remains 6, and 2 is 8, which ſet down; laſtly, 6 from 9 there remains 3, and 9 is 12, ſet down 2, neg'ect 10, and the remainer is as before.

	999999
	923802
	634256
	289546

Subtraction of Money.

PLace the leſſer ſumm of money under the greater, like Denominations one under another, as Pounds under pounds, ſhillings under ſhillings, Pence under pence, *&c.* under all draw a line, and begin your ſubtraction at the right hand, with the leaſt denomination.

When the lower Number of any denomination is equal to the upper, ſet down a cypher or cyphers and proceed to the next, as in this Example take 11 *d.* from 11 *d.* there remains nought, then take 10 *ſ.* from 10 *ſ.* there remains nought; ſet down Cyphers, and ſubtract the pounds as in the former Examples, ſaying 9 from Nought I cannot take, but 9 from 10 there remains 1, which ſet down, then 1 I borrowed, and 4 is 5, from 5 there remains nought.

	l.	*ſ.*	*d.*
Rent	50	10	11
paid	49	10	11
remains	1	10	00

When

When the upper Number of any Denomination is greater then the lower, ſubtract the lower, and ſet down what remains; as in this Example take 1 farthing from 3 *q.* there remains 2 *q.* which ſet down, then take 9 *d.* from 11 *d.* there remains 2 *d.* which ſet down; then 4 *ſ.* from 9 *ſ.* or 14 *ſ.* from 19 *ſ.* there remains 5 *ſ.* which ſet down, and Subtract the pounds as before.

	l.	*ſ.*	*d.*	*q.*
Lent	100	19	11	3
paid	99	14	09	1
remains	1	05	02	2

When the lower Number of any Denomination or kind is greater then the upper, then borrow one of the next denomination, from which ſubtract the lower, add what remains to the upper, and ſet down their ſumm, *&c.* as in this Example, 3 *q.* from 1 *q.* I cannot take, but 3 *q.* from a penny or 4 farthings there remains 1 *q.* and 1 *q.* above is 2 farthings, which ſet down, then reſtore the penny which you borrowed to the place of pence, ſaying, 1 *d.* I borrowed, and 10 *d.* is 11 *d.* take 11 *d.* from 2 *d.* I cannot, but 11 *d.* from 12 *d.* one of the next denomination, there remains 1 *d.* and 2 *d.* is 3 *d.* which ſet down, then 1 *ſ.* I borrowed, and 16 *ſ.* is 17 *ſ.* which from 4 *ſ.* I cannot take, but 17 *ſ.* from 1 pound or 20 *ſ.* there remains 3 *ſ.* and 4 *ſ.* is 7 *ſ.* which ſet down; then 1 *l.* I borrowed, and 8 *l.* is 9 *l.* from 0 I cannot take, but 9 from 10 there remains 1, which ſet down, then 1 I carry and 9 is 10, take nought from 1 and there remains 1, which ſet down, then 1 I carry and 5 is 6, from 8 there remains 2, which ſet down, and the work is finiſhed, which is proved as the former Examples.

	l.	*ſ.*	*d.*	*q.*
Lent	810	04	02	1
paid	598	16	10	3
remains	211	07	03	2
proof	810	04	02	1

Admit a Summ of money be lent, and part thereof paid at ſeveral times, and you would know what remains unpaid; add the ſeveral payments into one Summ, which ſubtract from the ſumm Lent, and the Remainer ſhews what is unpaid, as in this Example.

Lent	100	00	00
paid at times	30	10	11
	21	15	07
	18	16	09
	10	04	08
	12	00	00
paid in all	93	07	11
remains unpaid	6	12	01

Here follow *Subtractions* of the ſeveral kinds with their Proofs, whereof the Additions were preſented before. The ſame way of working is to be uſed in all as in Subtraction of Money, obſerving the values of the ſeveral Denominations, and what to borrow; wherein that you might not miſtake, the Characters and values of every Denomination are ſet over them.

Subtraction of Cloath-Meaſure.

Note that 4 Nails make 1 Quarter of a yard, 4 quarters make one Yard, 3 quarters of a yard make 1 Ell *Flemiſh*, and 5 quarters make 1 Ell *Engliſh*. This could not be ſet at large in Addition, in reſpect of order.

	Yards.	(4) *Qrs.*	(4) *Na.*
Bought	100	2	1
Sold	36	2	3
remains	63	3	2
proof	100	2	1

	Ells Eng.	(5) *Qrs.*	(4) *Na.*
	111	0	1
	99	3	2
	11	1	3
	111	0	1

	Ell Flem.	(3) *Qr.*	(4) *Na.*
	98	1	1
	65	2	2
	32	1	3
	98	1	1

Sub-

Subtraction of Averdupois Little weight.

Lb.	(16) Oun.	(16) Dr.
10	09	03
7	11	11
2	13	08
10	09	03

Subtraction of Averdupois Great weight.

C.	(4) Qr.	(28) Lb.	(16) Oun.
28	1	15	04
19	3	21	13
8	1	21	07
28	1	15	04

Subtraction of Troy-weight.

Lb.	(12) Oun.	(20) P.w.	(24) Gr.
16	05	11	10
12	10	16	20
3	06	14	14
16	05	11	10

Subtraction of Land measure.

Acr.	(4) R.	(40) P.
58	2	10
49	3	31
8	2	19
58	2	10

Subtraction of Liquid measure.

Tuns.	(4) H.h.	(63) Gal.	(2) Potl.	(2) Qrts.	(2) Pints.
31	1	13	0	0	0
10	2	34	1	1	1
20	2	41	0	0	1
31	1	13	0	0	0

Subtraction of Dry measure.

B.	(4) P.	(2) Gal.	(2) Pot.	(2) Qrts.	(2) Pts.
30	1	1	0	0	1
27	3	0	1	1	1
2	2	0	0	1	0
30	1	1	0	0	1

Queſtions reſolved by Addition and Subtraction.

1. What ſumm of Money is that from which if you ſubtract 53 *l.* 11 *ſ.* 2 *d.* 1 *q.* the Remainer ſhall be 46 *l.* 8 *ſ.* 9 *d.* 3 *q.* add theſe two ſumms, they make 100 *l.* the Number ſought.

2. What ſumm of Money is that to which if you add 46 *l.* 9 *ſ.* 8 *d.* 1 *q.* the Total ſhall be 100 *l.* ſubtract that ſumm from 100 *l.* the Remainer is 53 *l.* 10 *ſ.* 3 *d.* 3 *q.* the Number ſought.

3. Old *Par* was born in the year of our Lord 1483, and died in the year 1635. I demand his Age, and how long it is ſince he dyed. Subtract 1483 from 1635, the Remainer is 152, the yeares of his Age; then ſubtract 1635 from the preſent year 1664, the Remainer is 29, the number of yeares ſince he dyed.

4. A Leaſe was taken for 99 yeares, whereof 39 years are expired this preſent year 1664, I demand when that Leaſe began, and when it will expire. Subtract 39 the nnmber of yeares paſt from 99, the Remainer is 60, the number of yeares to come; then add 60 to 1664 the Total is 1724, and in that year of our Lord the Leaſe will expire.

5. A General had in his Army 15300 Horſe, and 36570 Foot, whereof there were ſlain in a Battel 7230, and taken 539 Horſe; alſo ſlain 17000, and taken 8930 Foot; I demand how many were ſlain and taken in all, and how many Horſe, and how many Foot eſcaped.

Add the four Numbers of ſlain and taken, their Summ is 33699, and ſo many were ſlain and taken in all; then Subtract the ſumm of thoſe ſlain and taken of the Horſe from the Number that came into the field, and the Remainer is 7531, ſo many Horſe eſcaped.

Then ſubtract the ſumm of thoſe ſlain and taken of the Foot from the Number that came into the Field, and the Remainer is 10640, ſo many Foot eſcaped.

MULTIPLICATION.

Multiplication, excuſing many Additions, from two Numbers given produceth a third, which contains one of the Numbers ſo many times as there be Units in the other.

Multi-

Multiplica

Multiplication is either Single, as when any one of nine figurea is Multiplyed by it self, or by another; or Compound, as when many figures are Multiplyed, *&c.*

The Number to be multiplyed is called the *Multiplicand*, and is written down first: the Number whereby that is multiplyed is called the *Multiplyer*, & is set under the first; Units under units, Tens under tens, *&c.* and the Number which is produced by multiplying one by the other is called the *Product*.

If 6 men were to receive each 5 shillings, and you were demanded how much it comes to in all, you might set down six Fives, and add them up to find their Summ, which would be 30. But by Multiplication you may perform this and the like with less expence of time and figures, thus;

The Multiplicand 6 *Men.*
The Multiplyer 5 *Money.*
The Product 30 *what all (must have.*

Here I say 5 times 6 is 30, which I set down under the line.

Before you can multiply large Numbers, unless you use the way after taught, you must get single Multiplication by heart, as follows;

1 *multiplyes not.*

2 *times* 2 *is* 4.
2 *times* 3 *is* 6.
2 *times* 4 *is* 8.
2 *times* 5 *is* 10.
2 *times* 6 *is* 12.
2 *times* 7 *is* 14.
2 *times* 8 *is* 16.
2 *times* 9 *is* 18.

3 *times* 3 *is* 9.
3 *times* 4 *is* 12.
3 *times* 5 *is* 15.
3 *times* 6 *is* 18.
3 *times* 7 *is* 21.
3 *times* 8 *is* 24.
3 *times* 9 *is* 27.

4 *times* 4 *is* 16.
4 *times* 5 *is* 20.
4 *times* 6 *is* 24.
4 *times* 7 *is* 28.
4 *times* 8 *is* 32.
4 *times* 9 *is* 36.

5 *times* 5 *is* 25.
5 *times* 6 *is* 30.
5 *times* 7 *is* 35.
5 *times* 8 *is* 40.
5 *times* 9 *is* 45.

6 *times* 6 *is* 36.
6 *times* 7 *is* 42.
6 *times* 8 *is* 48.
6 *times* 9 *is* 54.

7 *times* 7 *is* 49.
7 *times* 8 *is* 56.
7 *times* 9 *is* 63.

8 *times* 8 *is* 64.
8 *times* 9 *is* 72.

9 *times* 9 *is* 81.

2 *times*

2 *times* 12 *is* 24.
3 *times* 12 *is* 36.
4 *times* 12 *is* 48.
5 *times* 12 *is* 60.
6 *times* 12 *is* 72.
7 *times* 12 *is* 84.
8 *times* 12 *is* 96.
9 *times* 12 *is* 108.

This Table is the ſame in effect with what is delivered before, except the Multiplication of 12, *&c.* ☞

☞ 9|.81
8|64.72
7|49.56.63
6|36.42.48.54
5|25.30.35.40.45
4|16.20.24.28.32.36
3|9.12.15.18.21.24.27
2|4.6. 8.10.12.14.16.18
1.2.3. 4. 5. 6 7. 8. 9.

When you have imprinted ſingle Multiplication ſo perfectly in your memory from 2 to 9, that you can readily give any of the Products without book; thus, if you were asked at random how many 5 times 7 make, to anſwer ſuddenly 35; or 6 times 8, to anſwer 48 without premeditation; or 7 times 9, to anſwer immediately, 63, *&c.*

As for the Multiplication of 12 which is preſented with the reſt, though not of abſolute neceſſity here, yet being of excellent uſe after, it is here delivered to be treaſured in the memories of thoſe who advance further in this Art.

Being ready (as is ſaid before) in ſingle, you may proceed to compound *Multiplication*. Let it be required to know what 4 times 4321 will make, place the Numbers as before directed, thus;

The Multiplicand, 4321
The Multiplier, 4

Then

Then multiply the upper by the lower, proceeding from right to left, saying, 4 times 1 is 4, which set under the line, thus;

Proceed to the next figure, saying 4 times 2 is 8, which set under the line in the next place thus,

To the next, saying 4 times 3 is 12, set 2 under the line next to 8, and carry one in mind for the 10 to be added to the next place.

Then say 4 times 4 is 16, and 1 in mind is 17, which set wholly down, and the Total Product or 4 times 4321 is 17284, and the work will stand thus.

	4	3	2	1
				4
				4
	4	3	2	1
				4
			8	4
	4	3	2	1
				4
		2	8	4

Multiplicand, 4 3 2 1
Multiplier, 4
The Total Product, 1 7 2 8 4

Example 2. Multiply 6789 by 42, which being placed as is directed, and a line drawn under them, begin, saying 2 times 9 is 18, set 8 under the line, and carry 1 to be added to the next, saying 2 times 8 is 16, and 1 is 17; set down 7 and carry 1 to be added to the next, saying 2 times 7 is 14, and 1 is 15, set down 5 and carry 1 to the next, saying 2 times 6 is 12, and 1 is 13, which set wholly down; thus you have done with the first figure of the *Multiplier*, which

6789 *Multiplicand.*
42 *Multiplier.*
13578 *First product.*

which cancel and proceed to the next, ſaying 4 times 9 is 36, ſet 6 under the ſecond figure of the firſt product even with the 4 by which you multiply, & carry 3 to be added to the next, ſaying 4 times 8 is 32, and 3 is 35, ſet down 5 and carry 3 to the next, ſaying 4 times 7 is 28, and 3 is 31, ſet down 1 and carry 3 to the next, ſaying 4 times 6 is 24, and 3 is 27, which ſet wholly down; then add theſe two Products into one Sum, and it appears that 24 times 6789 or the Total product is 285138.

6789	*Multplicand.*
42	*Multiplier.*
13578	*firſt Product.*
27156.	*ſecond Product.*
285138	*total Product.*

Example 3. *Wherein a more compendious way of Expreſſing is uſed.* Begin as before, ſet down what Numbers are leſs or more than ten or tens as they ariſe, ſaying 7 multiplied by 8 is 56, 6 and carry 5, then 7 by 0 is nought, ſet down 5; then 7 by 7 is 49, 9 and carry 4, then 7 by 0 is nought, but 4 ſet down, then 7 by 5 is 35, which ſet down.

50708	*Multiplicand.*
817	*Multiplier.*
354956	*Particular*
50708	*products.*
405664	
41428436	*The Total product*

Thus you have done with the firſt figure, which you may cancel, and proceed to the next, which being 1, in regard it doth not multiply, ſet the whole Multiplicand under the firſt Product, a place further toward the right hand; Cancel the 1, and t the next, ſaying 8 by 8 is 64, 4 and carry 6, but be ſure to place that 4 directly even with the Multiplie and a place beyond the firſt figure of the laſt product; then 8 by 0 is nothing, ſet down the ſix you carry then 9 by 5 is 40, which ſet down, draw a line under all, add up the particular products, ſet their Sum under the line as it ariſes, ſo have you the Total product.

Compe

Compendious, or ſhort wayes of Multiplication.

To Multiply any Number by 5.

Add or ſuppoſe to be added a Cypher to the Multiplicand, then begin at the left hand and take half for the Product. *Example:* Multiply 64783 by 5, add a Cypher as in the margent, and half it, ſaying, the half of 6 is 3, which ſet down 3 the half of 4 is 2, the half of 7 is 3, and there remains 1, which ſuppoſe to ſtand before the 8, then the half of 18 is 9, the half of 3 is 1, which with the Cypher makes 10, the half whereof is 5, which ſet down and the work is finiſhed.

647830
5
323915

To Multiply any Number by 9.

Add a Cypher to the Number which you would Multiply, then ſet the ſame nomber under it without a cypher, which ſubtract from the uppermoſt, and the remainder is the product by 9; *Example*, take the former Number, to which add a cypher as before.

647830
64783
583047

When you are to multiply any Number by 10, 100, 1000, *&c.* add ſo many cyphers to it, and the work is done, thus multiply 234 by 10 it makes 2340, by 100 it makes 23400, by 1000 it makes 234000, *&c.*

When the Multiplicand hath Cyphers in the firſt, ſecond, third place, *&c.* multiply the ſignifying figures by the Multiplier, and ſet down the Cyphers. *Example:* Multiply 31000 by 26.

31000
26
186
62
806000

When both end with Cyphers, Multiply by the ſignifying Figures, and ſet down the number of Cyphers in both. *Example:* Multiply 36000 by 2400, thus;

36000
2400
144
72
86400000

The Proof of Multiplication.

Set the third Example down again, thus;

Caſt away the nines in the Multiplier, and ſet 7 the Remainer on the right ſide of the Croſs; then do the like in the Multiplicand, and ſet 2 the remainer on the left ſide. Multiply theſe two together, caſt away the nines in their product, and ſet 5 the remainer above the Croſs: then caſt away all the nines that the product will make, ſet the remainer under the Croſs; if the figure above and that below be the ſame, the work is true, elſe not. There is another way to prove Multip'ication, that is by Diviſion, which is delivered hereafter.

50708	
817	
354956	5
50708	2+7
405664	5
41428436	

To perform Multiplication by Addition and Duplication, without troubling the Memory.

Let 9875 be given to be Multiplied by 6957. Frame a Table as in the margent, write down the nine figures, or to the largeſt figure in the Multiplier; for if that extends not to 7, 8 or 9 you need not ſet them down: Againſt 1, write the Multiplicand; for 2, double it; for 3, take the ſumm of thoſe; for 4, double the number of 2; for 5, add thoſe of 3 and 2; for 6, double that of 3; for 7, add 3 & 4; for 8, double 4; for 9, add 4 and 5: which done, ſet down the Multiplicand, ſubſcribe the Multiplier and draw a line underneath as formerly; then take the Number anſwering 7 in the Table, which place under the Multiplier; Units under units, tens under tens, *&c.* Thus take out a Number for every Figure in the Multiplier, obſerving to place ever one a degree further then other toward the left hand; under all draw a line, add them up, their ſumm the Product, *&c.*

	Multiplicand
9875	9875
6957	19750
69125	29625
49375	39500
88875	49375
59250	59250
68700375	69125
	79000
	88875

Queſtio

Questions resolved by Multiplication.

1. *I demand how many dayes since the Nativitie of our Lord and Saviour* JESUS CHRIST *unto this present year* 1664 ? *Multiply* 1664 *by* 365 *the number of dayes in one year , the Product shews it is* 607360 *dayes, besides* 416 *dayes for leap yeares.*

1664
365
8320
9984
4992
607360

1 2 3
1 2 3

2. *There is a square piece of Ground which is* 123 *yards over each way, I demand how many yards square it contains ? Multiply* 123 *by* 123, *the Product is* 15129, *the number of yards square.*

1 5 1 2 9

3. *Admit a Court-yard be* 678 *feet in length, and* 345 *feet in breadth , and is paved with Stones, each a foot square ; I demand how many Stones there are in all ? Multiply the length by the breadth , the Product is the answer, thus ;*

678
345
30
2435
181840
2132
24
233910

DIVISION.

BY *Diviſion* we find how often a leſſer Number may be had in a greater; and divide a Number into as many equal parts as occaſion may require. Thus, if you ask how often or how many times you can have 2 in 12, the anſwer will be *6*.

The Greater number, or that which is to be divided, as 12, is called the *Dividend*: the Leſſer number, or that whereby That is divided, as 2, is called the *Diviſor*: and the Number which anſwers to the queſtion how many times, as *6*, is called the *Quotient*.

When one Number is given to be Divided by another, you muſt firſt write down the *Dividend* or number to be divided, and make two Compaſs-ſtrokes one at each end thereof, thus; *Dividend.*

That ſtroke toward the left hand is to compaſs in the *Diviſor*,) 12 (
thus;

Diviſor. 2) 12 (

And in that ſtroke toward the right hand the figure or figures of the quotient are to be placed. So when we ask how many times we can have 2 in 12, and find *6* times, that *6* is the Quotient, and placed thus,

dividend.

Diviſor. 2) 12 (6 *Quotient.*

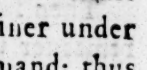
The work of *Diviſion* is performed by *Multiplication* and *Subtraction*.

The Rule

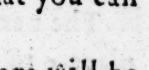
When the Dividend and Diviſor are written down according to direction, firſt ask how often you can have the diviſor in the dividend, or in ſo much thereof as may contain the diviſor, and place the figure which anſwers

anſwers to the queſtion in the Quotient: then multiply the Diviſor by the quotient, and ſet their product over the dividend, which product ſubtract from the dividend, and write the Remainer under. If all the figures of the Dividend be not divided at the firſt working, put the next queſtion upon the Remainer under it and the next uncancell'd figure therein, placing a figure or cypher in the quotient at every demand; thus repeat the former work, if need be, again and again till the Diviſion is finiſhed. Take notice that you can ſet but a ſingle figure in the quotient at any one demand.

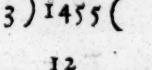
Suppoſe 1455 pounds are to be equally divided between 3 men, the Quotient or each mans ſhare will be 485 pounds. Thus, place the numbers as is directed; ask the queſtion in ſo much of the Dividend as will contain the Diviſor, ſaying how many times 3 can I have in 14, anſwer 4 times; place 4 in the quotient, and thereby multiply the Diviſor, ſaying 4 times 3 is 12, which product place over 14 in the Dividend, thus;



Then ſubtract the product 12 from 14, and cancel the figures of both thoſe two Numbers with a daſh of the pen as you ſpeak, and write down the Remainer, ſaying 12 out of 14 and there remains 2, and your work will ſtand thus;



Now 2 the Remainer and the following 5 in the Dividend make 25, for the next queſtion ſay, how many times can I have 3 in 25? anſwer 8, which place in the quotient and multiply the Diviſor thereby, ſaying 8 times 3 is 24, which ſet over the 25 thus;



Then

Then ſay 24 out of 25 there remains 1, cancel the figures as you ſpeak, and ſet the remainer under, and your work will ſtand thus,

```
    2
   124
3)1455(48
   21
```

The next queſtion will be, how many times 3 you can have in 15, anſwer 5 times; place 5 in the quotient, then 5 times 3 is 15, to be ſet over 15 and ſubtracted, and nothing remains, and the work is finiſhed, thus;

```
    21
   1245
3)1455(485
   12
```

Exerciſe will bring the Learner to divide any Number by one figure without ſetting down more figures than thoſe in the quotient; Therefore I ſhall give but one Example more by a ſingle Figure, wherein the nine Digits are Dividend, and 9 the Diviſor; thus ask how oft you can have 9 in 12, anſwer once, ſet 1 in the quotient, and becauſe 1 will not multiply, ſet 9 over 12 and ſubtract, there remains 3, thus;

```
   9
9)123456789(1
   3
```

The next queſtion is how oft you can have 9 in 33, anſwer 3 times, place 3 in the quotient, and multiply, ſaying 3 times 9 is 27, which ſet over 33 and ſubtract, there remains 6, thus;

```
   2
   97
9)123456789(13
   36
```

The next queſtion is how many times you can have 9 in 64, anſwer 7 in the quotient, then 7 times 9 is 63, ſet over 64 and ſubtract, there remains 1, thus;

```
   26
   973
9)123456789(13
   361
```

The next queſtion is how oft you can have 9 in 15, anſwer once, place 1 in the quotient, ſet 9 over 15, and ſubtract there remains 6, thus;

```
   26
   8739
9)123456789(1371
   3616
```

Next ask how many times 9 in 66, anſwer 7 in the quotient, then 7 times 9 is 63, place over 66 and ſubtract, the remainer is 3, thus;

```
   26  6
   97393
9)123456789(13717
   36163
```

Next ask how many times 9 in 37, anſwer 4 in the quotient, then 4 times 9 is 36 placed over and ſubtracted, there remains 1, thus;

```
   26  63
   973936
9)123456789(137174
   361631
```

Then ask how many times 9 in 18, anſwer 2 in the quotient, then 2 time 9 is 18, placed over 18 and ſubtracted, there remains nothing.

Laſtly, how oft can we have 9 in 9, once; place 1 in the quotient and 9 over 9, ſubtract and there remains nothing, thus;

```
   26  631
   97393689
9)123456789(13717421
   361631
```

I ſhall here perform my former promiſe of proving Multiplication by Diviſion, where you will ſee that what Multiplication ſcatters, Diviſion gathers together.

Take

Take the ſecond Example in compound *Multiplication*; divide the *Product* by the *Multiplier*, the *Quotient* gives the *Multiplicand*. Begin, and ſeeing the diviſor cannot be had in the firſt two figures of the Dividend, ask how oft 42 in 285, or 4 in 28, anſwer ſeven times, then ſeven times 4 is 28, from 28 there remains nought, and ſeven times 2 is 14 from 5 you cannot take; here it appears you have taken one too much for the quotient, therefore take it one leſs; place 6 in the quotient, and thereby multiply the diviſor, ſaying 6 times 2 is 12, ſet 2 over 5 in the dividend, carry one, then 6 times 4 is 24, and 1 is 25, which ſet over 28; thus have you the product 252, which ſubtract from that part of the Dividend over which it ſtands, and ſet down what remains; beginning at the right hand as in the former Subtractions, ſaying 2 from 5 there remains 3, which ſet under 5; then 5 from 8 there remains 3, which ſet under 8; laſtly, 2 from 2 there remains nought. Remember to cancel all the figures as you name them in working, except the remains: and the firſt work will ſtand as in the Margent.

```
     252
42)285138(6
     33
```

Put the next queſtion on the remains and the next figure of the Dividend, ſaying how oft 42 in 331, or how oft 4 in 33, anſwer eight times, but you cannot have eight times 2, which is 16 in 11 that would conſequently remain; therefore take one leſs, ſet 7 in the quotient; then 7 times 2 is 14, ſet 4 over 1 and carry one; then 7 times 4 is 28, and one you carry is 29 which ſet over the dividend even with 33, ſubtract and ſet down what remains; ſaying, 4 from 10 there remains 6, and 1 is ſeven, which ſet under; then one I borrowed and 9 is 10, take nought from 3 and there remains 3; then one I carry and 2 is 3, from 3 there remains nought, and the work will ſtand thus.

```
     29
    2524
42)285138(67
    337
```

The

The next query is how oft 42 in 373 anſwer 8 in the quotient, for you may foreſee, as formerly, that 9 would be too much; then 8 times 2 is 16, ſet 6 over 3 and carry one; then 8 times 4 is 32, and one is 33, which ſet even over 37; ſubtract, and ſet down what remains, ſaying 6 from ten there remains 4, and 3 is 7, which ſet under; then one you borrowed, and 3 is 4, from 7 and there remains 3, which ſet under; laſtly, 3 from 3 there remains nought, & the work will ſtand, thus;

```
      3
     293
    25246
42)285138(678
    3377
      3
```

The next and laſt queſtion is how oft 42 in 378, anſwer 9, for more can never be ſet in the quotient at once; then 9 times 2 is 18, ſet 8 over 8, carry one; then 9 times 4 is 36, and 1 is 37, which ſet over 37, ſubtract and there remains nought. Thus the quotient is the ſame with the former Multiplicand and proves it true.

```
      33
     2937
    252468
42)285138(6789
    3377
      33
```

Take the third Example in Compound Multiplication; let the Product be Dividend, the Multiplier Diviſor, and the quotient will be the ſame with the Multiplicand.

You may diſtinguiſh ſo much of the Dividend, by a Comma, or ſmall daſh of the pen, as may contain the Diviſor: here the firſt three figures will not contain the Diviſor; therefore put a comma after the fourth; then ask how oft 817 in 4142, (ſee this Example in Multiplication, and the Multiplicand will ſhew what figures muſt be placed in the quotient) ſet 5 in the quotient; Multiply, Subtract, Cancel, as before, and the firſt work ſtands thus;

```
     4085
817)4142,8435(5
     57[illegible]
```


Put

Put the question upon the Remainer and the next figure of the Dividend; saying, how oft 817 in 578? answer nought; set a Cypher in the quotient, and put a Comma, or point after the next figure in the Dividend: then say, how oft 817 in 5784? answer 7, in the quotient (for you see 7 is the next figure in the Multiplicand;) then Multiply, subtract, cancel, as before; and the work will stand thus,

```
        57
      408519
817)414284,36(507
      5765
```

The next question is, how oft 817 in 653? answer nought; set a Cypher in the quotient, and say how of 817 in 6536? answer 8, in the quotient; by which multiply the Divisor, set the product over the Dividend; Subtract, and there remains nought, which proves the work to be true.

```
        5765
      40851936
817)41428436(50708
      5765
```

Divide 3107198405 by 9657. And that you may readily know what figure to set in the quotent, at every demand; compose a Table with the Divisor, by Addition and Duplication, in the same manner as was taught in the last way of Multiplication, by the Multiplicand, as in the Margant.

Divisor	
9657	1
19314	2
28971	3
38628	4
48285	5
57942	6
67599	7
77256	8
86913	9

Having set the Dividend and Divisor down, according to the former order, make the first demand in so many figures of the Dividend as will contain the Divisor, which distinguish by a point or Comma as before; the number is 31071. Now see what Number in the Table is nearest in value to this Number: the number against 2 is too little, which amounts to but 19 thousand and odd; and that against 4 is too much, therefore take that number against 3; set 3 in the quotient, and set his number over the distinguished number in the Dividend, Subtract, set the remains under, and the first work will stand thus.

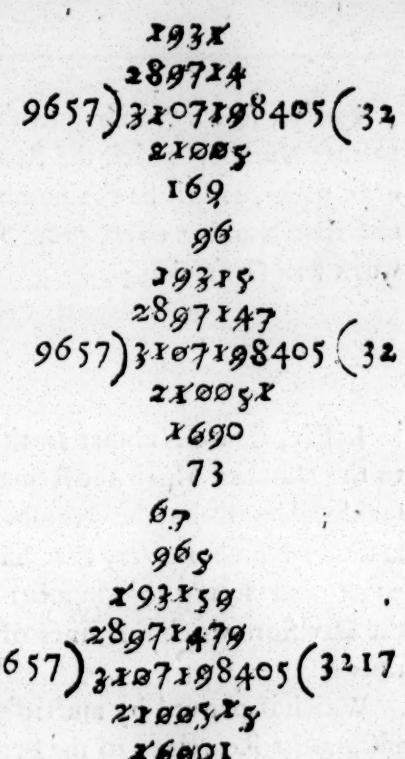
```
      28971
9657)31071,98405(3
      2100
```

Second-

Secondly, over the remains, and the next figure of the Dividend, place that Number in the Table neareſt the value, which is that againſt 2; ſet 2 in the quotient: ſubtract as before, and ſet the remains under, thus;

Thirdly, find a Number in the Table which is neareſt in value to that Number which the Remains and the next figure of the Dividend make; it will not be ſo much as that of 2: therefore ſet the Diviſor over, and 1 in the quotient; Subtract, ſet down the Remains, and the work will ſtand thus;

Fourthly, find a Number in the Table which comes neareſt in value to the Number which the Remains and the next figure of the Dividend make, it will be the Number anſwering 7; ſet 7 in the quotient, and that Number over, &c. Subtract, ſet down the Remains, and the work will ſtand thus;



Fiftly, find a Number in the Table which comes neareſt in value to that Number which the Remains and the next figure of the Dividend make, it will be the number anſwering 5; ſet 5 in the quotient, and that Number over, &c. Subtract, ſet down the Remains, and the work will ſtand thus;

4
678
9652
193x598
2897x4795
9657)3107198405(32175
2x005x55
x69016
7348
55

Laſtly, find a Number in the Table which comes neareſt in value to the Number which the Remains, and the laſt figure in the Dividend make; it will be the Number anſwering 6; ſet 6 in the quotient, and that Number over, &c. Subtract, ſet down the Remains, which is 713: and ſeeing that number is the final remainder, part it from the Diviſion which the lines of ſeparation, and the work will ſtand thus;

Which is proved by multiplying the Quotient by the Diviſor, and adding the Remainer to the Product, it makes the ſame Number with the Dividend.

45
6787
96529
193x5984
2897x47952
9657)3107198405(321756
2x005x55(3 9657
x69016(1 2252292
7348(7 1608780
55 1930536
2895804
3107198405

Contractions in Division.

WHen the *Dividend* and *Divisor* have Cyphers in the first, second, and third place, *&c.* cut off an equal number of Cyphers from both, with a dash of the pen; and work with the significant Figures.

Example. Divide 43200 by 1200.

```
        7
       362
12|00)432|00( 36
        7
```

When the *Divisor* onely hath Cyphers in the first, second, third place, *&c.* separate the Cyphers with a stroke, and the same number of Figures from the *Dividend*: those on the left side of the stroke in the *Dividend* are to be divided, *&c.* those on the right side are remains.

Exampli. Divide 256894 by 1200.

```
        14
       2428
12|00)2568|94(214
        14
```

When the *Divisor* is 10, 100, 1000, *&c.* Separate so many places of the *Dividend* for remainer, as there are Cyphers in the *Divisor*; those beyond the stroke toward the left hand are the Quotient.

Example. Divide 91725 by 100,

```
        Quotient Rem.
100)    917 / 25
```


Que-

Queſtions reſolved by Diviſion.

THe firſt Queſtion in *Multiplication* wrought back.

In 607360 dayes, how many yeares ?

365)607360(1664
24
24
23

What Number is that which being multiplied by 23, the product will be 5382? divide 5382 by 23, the quotient is 234, the Number ſought.

The ſumm of 234 pounds is to be equally divided amongſt 5 men, I demand each man's ſhare.

Here 234 *l.* is divided by 5, the quotient is 46 *l.* for every man, and 4 remains; which 4 being a part, multiply by ſo many of the next denomination as make one of the whole, which is ſhillings; then divide the product by the Diviſor, and the quotient ſhews that each man muſt have 16 ſhillings more to compleat his ſhare.

5)23(4(46

If 1248 Buſhels of Corn be equally divided amongſt 24 men. I demand how many Buſhels each man muſt have ?

You may divide 1248 by 24 the whole Diviſor or by it's parts, but here becauſe 4 and 6 are the parts; for 4 times 6 make 24; I divide 1248 by 4, the quotient is 312, which divide by 6, the other part of the diviſor, the quotient ia 52, the number of Buſhels that each man muſt have. *So much for* Diviſion.

Reduction

REDUCTION.

Reduction changes the Denominations of Numbers, delivering the same value in other Terms.

The work of Reduction is perform'd by Multiplication and Division.

Division brings lesser Denominations into greater.

To reduce greater Denominations into lesser, multiply by so many of the lesser as make one of the greater. *Example.* Reduce 1234 shillings into pence; multiply by 12, thus;

s.
1234
12
14808 *d.*

To reduce lesser Denominations into greater, divide by so many of the lesser as make one of the greater. *Example.* Reduce 1808 pence into shillings, divide by 12, thus;

	234	
	12468	*s.*
12)	14808	(1234
	244	

Reduction of Money.

For the values of the several denominations, see the Tables delivered in Addition.

In 123 pounds sterling how many shillings and pence. Multiply by 20 to bring them into shillings, and that product by 12 to bring them into pence. If you have the Table of 12 ready in mind, you may give the product in one line, thus.

l.
123
20
2460 *s.*
12
29520 *d.*

In 25520 pence how many ſhillings and pounds, firſt divide by 12, the Quotient is ſhillings, which bring into pounds by Dividing by 20, as you are taught in the laſt Rules of Diviſion, thus;

```
      47
      2482      ſhillings
12 ) 29520 ( 2460
      57
                pounds
210 ) 24610 ( 123
```

In 120 *l.* 19 *ſ.* 11 *d.* how many Farthings?

First Multiply the pounds by 20 to bring them into ſhillings, and take 19 ſhillings into the product, which multiply by 12, and take in the 11 pence; laſtly, multiply that product by 4 to anſwer the queſtion in Farthings, thus;

```
 l.  ſ.  d.
120 19 11
    20
   2419 ſ.
     12
  29039 d.
      4
 116156 farthings
```

In 116156 Farthings how many Pence, Shillings and Pounds? Make the former Multiplyers Diviſor the Quotients anſwer the queſtion.

Cu

Cut off the laſt figure in the ſhillings, begin at the left hand and take the halfe for pounds, and there remains 19 ſhillings, which with the 11 *d.* remaining in the former work returns the ſumme firſt given.

3 3
86128 *pence.*
4)116156(29039
3 3

x
410
24828 *ſ.*
12)29039(24. 119
52(11 12 *l.*
x

In 2345 *l.* how many Farthings?
960 the Farthings in 1 *l.*

14070
21105

In 2251200 Farthings how many pounds?

34
2888
192840 *pounds ſter.*
9610)22512010(2345
3338
44

In 2345 *l.* how many Groats?
60 the Groats in 1 *l*

In 140700 Groats how many Pounds?

123
12840 *pounds ſter.*
610)1407010(2345
223

In 1626 Marks how many Pounds?

2 Nobles make a Mark

Diviſor 3) 3252 Nobles

1084 Pounds

3 Nobles makes a Pound *ſter.*

Diviſor 2) 3252 Nobles

1626 Marks.

Reduction of Cloath Meaſure.

IN 432 Yards how many Quarters and Nails?

4 Quarters make a Yard

1728 Quarters.

4 Nails make a Quarter.

In 6912 Nails how many Yards.

The Nails in 1 Yard 16) 6912 (432 yards.

In 438 Ells *Engliſh*, how many El's *Flemiſh*?

5 the Quarters in 1 Ell *Engliſh*

2190 Quarters

3) 2190 (730 Ells *Flem.*

5) 2190 (438 Ells *Eng.*

Reductio

Reduction of Averdupois Weight.

IN 12 *C*? 3 *qrs.* 19 *lb.* how many ounces.

4
51 *qrs.* with the three *qrs.* taken in
28 *lb.* in a *qr.*
408
102
1447 *lb.* with the 19 taken in, or added
16 ounces in a pound
8682
1447
In 23152 ounces how many *c. qrs.* and *lb.*

ads.
1 (1447

22
1124
112 *lb.*) 1447 (12 *C.*
323
10
84
28) 103 (3 *qrs.*
19 *lb.*

Reduction of Troy Weight.

IN 64 *lb.* 10 *oun.* 8 *d w.* how many Graines?

12
778 *ou.* the 10 *ou.* taken in
20
15568 *d w.*
24
62272
31136
In 373632 Grains how many *d w. oun.* and *lb.*

111
12249
240042 *penny waits.*
24) 373632 (1556 | 8 Cut off the last figure and half the rest for ounces.
13119 7780 *oun.*
1

4
728
12) 778 (46 *lb.*
50
(10 *oun.*

 The

The GOLDEN RULE

IS ſo named for its Uſefulneſſe and Excellency above all other Rules in *Arithmetick*. It is alſo called the Rule of *Three*, becauſe in queſtions to be reſolved thereby there are three known Numbers given, for the finding of a fourth unknown. This Rule ſometimes requires the aſſiſtance of all the former Rules, but more frequently of Multiplication and Diviſion.

And is in Effect uſed by every man that hath any Dealings in the world, though they know it not according to Art. For in all Buying and Selling when we give *ſo much* for one, two, or more things of any kind, and would know how much two or more of the ſame things would coſt according to that rate. This in ſmall Matters is commouly done by the Rule of Reaſon which is the ſame with the Rule of *Three*, thus, If two pound weight of any Commodity coſt three ſhillings, what will four pounds of the ſame coſt according to that rate? you will ſay they muſt coſt ſix ſhillings; for reaſon tells you, that if two pounds coſt three ſhillings, that four pounds will coſt as much more.

But this Rule, according as it is wrought with the Pen, is of excellent uſe in reſolving ſuch like Queſtions as cannot be anſwered by rational conſideration only.

And the firſt thing you are to learn in order to it, is to know how to ſtate a Queſtion; and in what order to write down the Numbers; which is thus,

For example, take the Queſtion before given.

Place the Number which belongs to the Suppoſition and follows the word [*if*] (as 2) in the firſt place, thus, If

If 2 lb.

Then ſet that Number which belongs to the firſt and follows the word coſt (*as* 3) in the ſecond place toward the right hand, thus, *If 2 lb. coſt 3 ſ.*

Laſtly, ſet the third Number which is of the ſame denomination with the firſt, and whereof the Queſtion is demanded, or the Number which follows theſe two words what *what coſt*, or how much (*as* 4) in the third place toward the right hand, and the Queſtion will ſtand thus,

If 2 lb. coſt 3 ſ. what coſt 4 lb.

To work all Queſtions of this nature, we muſt multiply two of the three given Numbers together, the the ſecond or third, or the firſt and ſecond, and divide their product by the other Number, which is the firſt or the laſt, and the Quotient anſwers the Queſtion.

To find which muſt be Diviſor: This is

THE RULE.

IF the Number ſought muſt in reaſon be greater then the ſecond Number, the leaſt of the two Extreams (which are the firſt and third numbers) muſt be Diviſor.

If the number ſought is required to be leſſer than the ſecond Number, then the greateſt of two Extreams or end Numbets muſt be Diviſor.

Work the Queſtion propounded, wherein you may foreſee that the Number ſought muſt be greater then the ſecond Numbet. Therefore multiply the ſecond Number by the third; or the third by the ſecond, and let (2) the leaſt Extream be Diviſor, thus, *If 2 lb. coſt 3 ſ. what coſt 4 l.*

$\frac{4}{12}$ *product* $\frac{4}{12}$ $\quad 2\,)\,\cancel{12}\,(\,6$ ſ. The Number ſought.

Queſt. 2. *If eight men digge a Trench in twelve daies, in how many dayes will ſixteen men do the like work?*

HEre more men require leſſe time, wherefore the Number ſought muſt be leſſe than the ſecond; therefore multiply the firſt Number by the ſecond, or the ſecond by the firſt, and divide by 16 the greater of the two extreams thus,

Men	*daies*	*men*
8 ..	12 ::	16 ..
	8	
	product 96	16) 96 (6 *daies*, The Number ſought.
		96

The Golden Rule *is diſtinguiſhed or divided into two Rules, the one Direct, the other Reverſe, and then,*

A Queſtion whoſe firſt Number is Diviſor depends on the Direct or forward Rule of *Three*. A Queſtion whoſe third number is Diviſor, depends on the Reverſe, or Backward Rule of *Three*.

Thus the firſt firſt Queſtion belongs to the direct; the ſecond to the Reverſe Rule of *Three*.

And both are termed *Rules of Proportion*.

Proportion direct is, when the fourth Number bears ſuch proportion to the ſecond, as the third Number bears to the firſt; Thus in the firſt Queſtion as 6 the fourth Number bears double proportion to 3 the ſecond, ſo doth 4 the third Number to 2 the firſt.

And

And here the product made by Multiplication of the two Meanes or middle Numbers, is the ſame with the Product of the two Extreams, which is the beſt proof for all Queſtions wrought by this Rule.

Proportion Reverſe is, when the fourth Number bears the ſame proportion to the ſecond, as the firſt doth to the third.

Thus in the ſecond Queſtion, as 6 the fourth Number is the half of 12 the ſecond, ſo 8 the firſt Number is the half of 16 the third: and here the Product made by Multiplication of the third and fourth Numbers is the ſame with the Product of the firſt and ſecond. Which is the the beſt proof for all Queſtions wrough by this Rule?

☞ In all Queſtions depending on the *Golden Rule*, Reduce the firſt and third Termes or Numbers into one Denomination if they be not ſo. Alſo Reduce the ſecond into the leaſt Denomination mentioned; Then Work as is directed, and you ſhall find a fourth Number of the ſame Denomination which you left the ſecond in.

If

If 5 yards of Cloath cost 3 l. 16 s. 8 d. what cost 18 yards 3 qrs.

Here when the Numbers are reduced I multiply the second by the third, & divide by the first, the quotient is 3450 pence, which I divide by 20 & 12, &c.

	yards	l.	s.	d.	yards	qrs.
	5..	3.	16.	8::	18.	3.
	4	20			4	
The first Numb. reduced	20 qrs.	76 s.		The third Number reduced	75 qrs.	
		12				
The second Number reduced		920 d.				
		75				
		4600				
		6440				
		69000 Dividend.				

```
        1                 pence (6d.  (shil.
2|0 ) 680        ( 3450          (28|7
qrs.  69000|0    12              l. s. d.
        1                        14.7.6.
```

The same Question wrought back.

If 18 yards 3 qrs. cost 14 l. 7 s. 6 d. what cost 5 yards?

```
        4          20          4
Divisor 75 qrs.    287 s.      20
                   12
                   3450 d.
                     20
                   69000 Dividend.
```

```
        15          7
        6350        842
75 ) 69000 ( 12 ) 920  ( 7|6
        15          8(8d.  3l.16s.8d.
```

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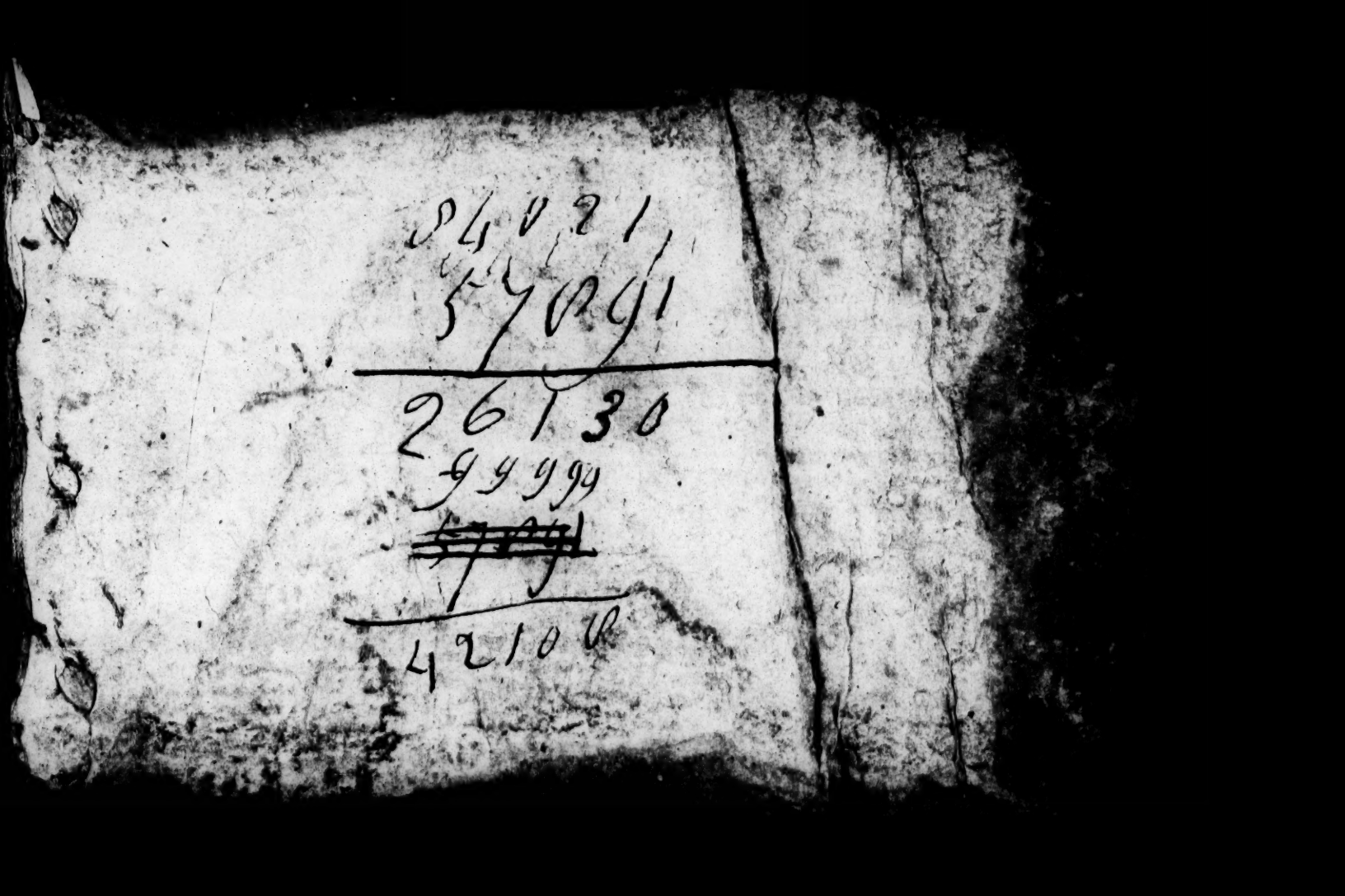
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